Sept. 13, 1949. C. W. GIBSON 2,481,836

ROTARY FUEL BURNER WITH A DISK TYPE FUEL-DISTRIBUTING MEANS

Filed June 19, 1946 3 Sheets-Sheet 1

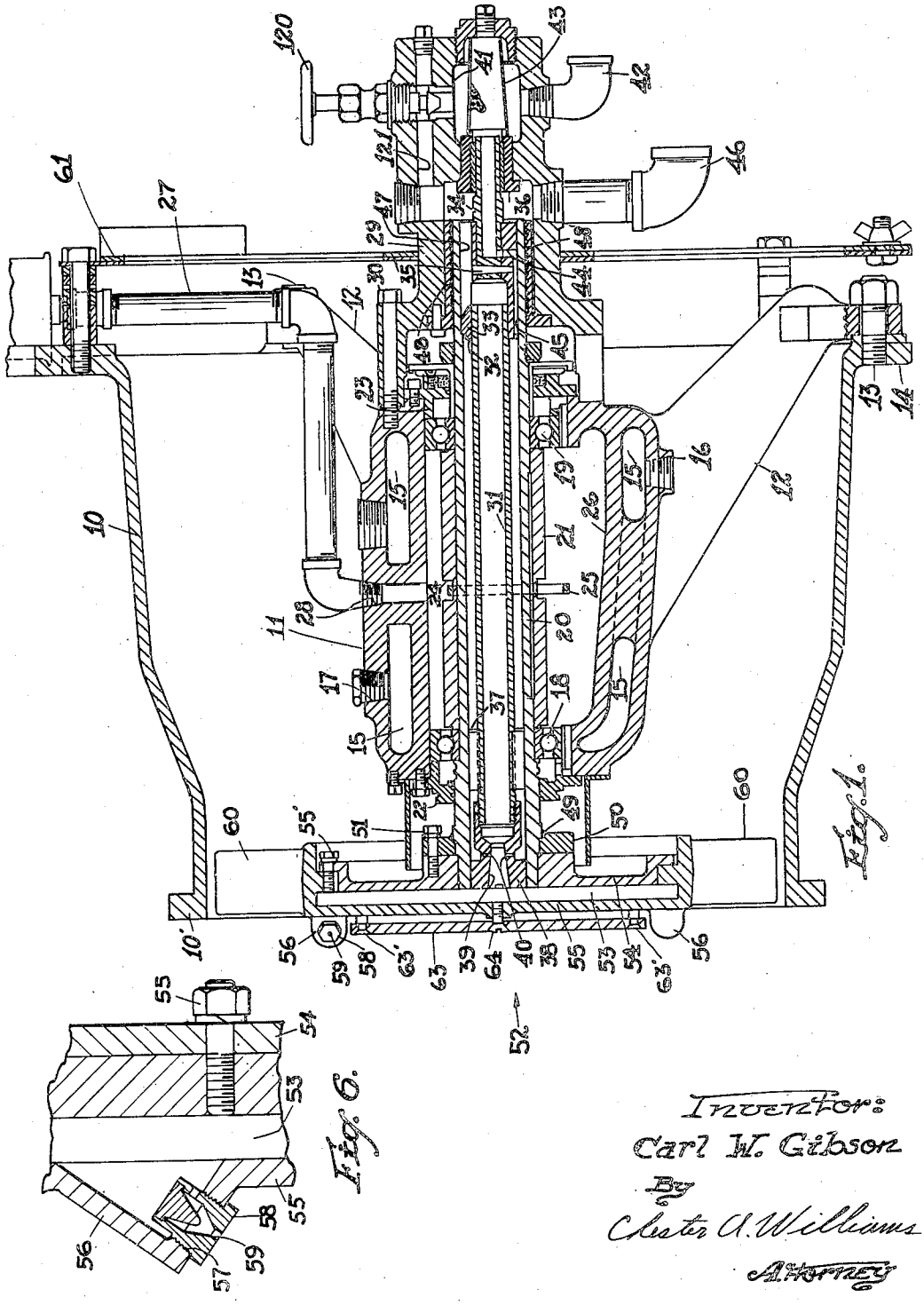


Fig. 1.

Fig. 6.

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Filed June 19, 1946 3 Sheets-Sheet 2

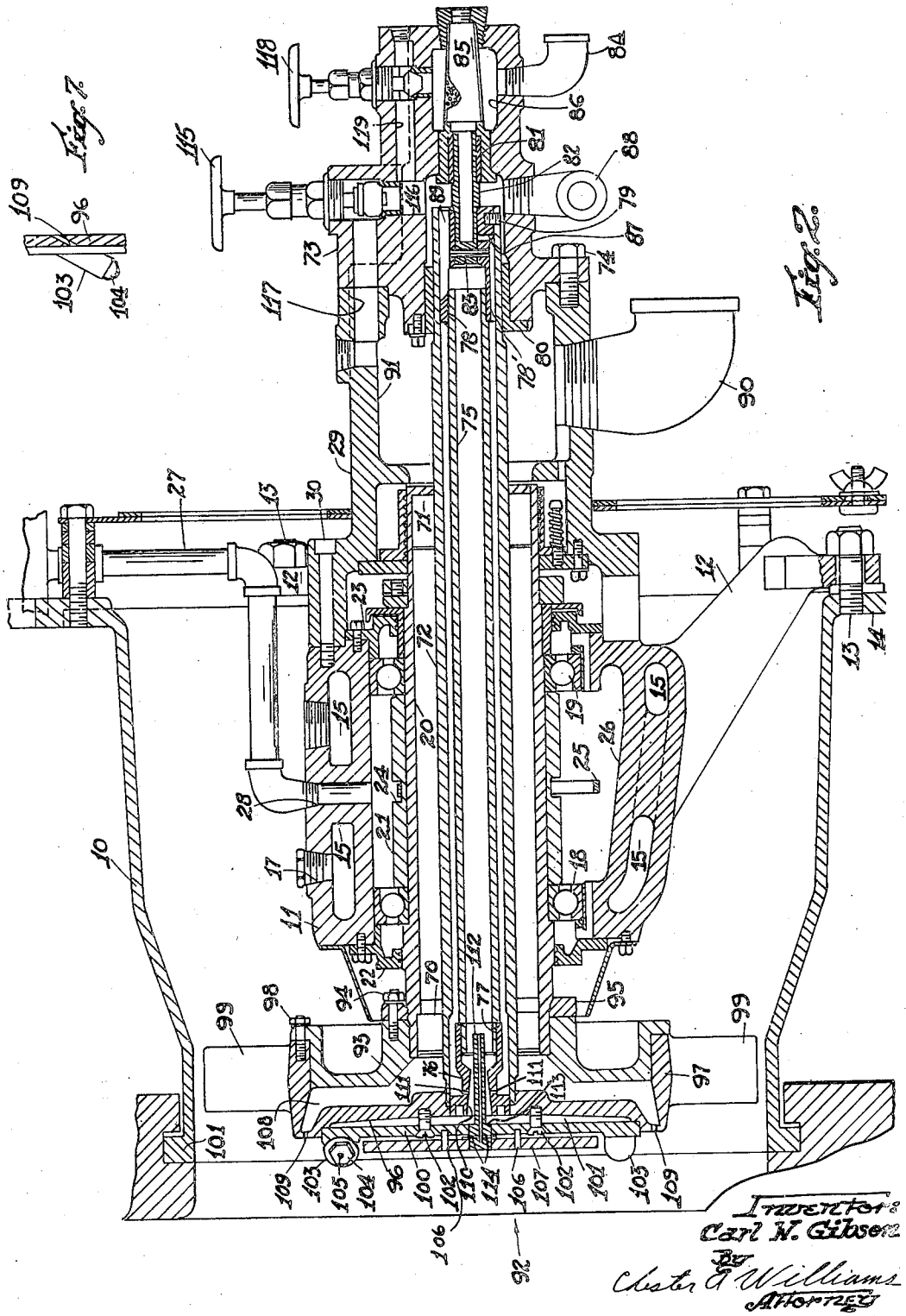


Fig. 2.

Fig. 1.

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Filed June 19, 1946 3 Sheets-Sheet 3

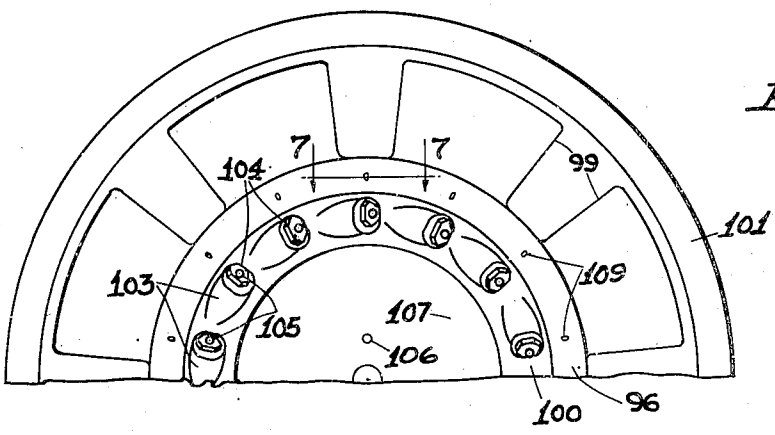


Fig. 5.

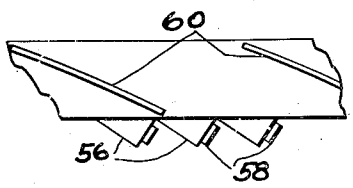


Fig. 4.

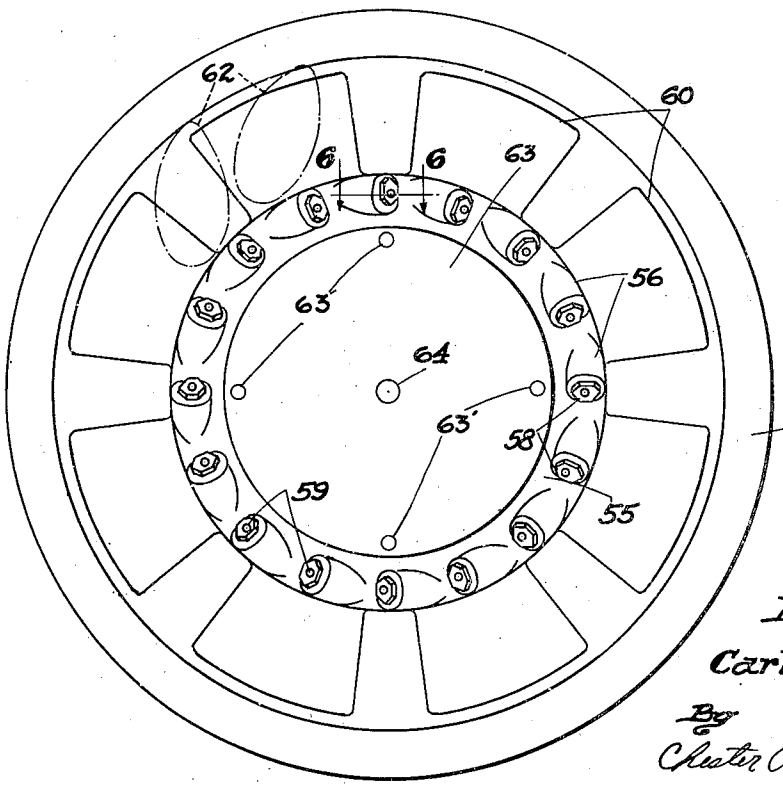


Fig. 3.

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ROTARY FUEL BURNER WITH A DISK TYPE FUEL-DISTRIBUTING MEANS

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18 Claims. (Cl. 158—11)

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The present invention relates to fluid burners, and more particularly to a rotary type burner adapted for association with a boiler or furnace and which may employ oil, gas, a combination of oil and gas, or a colloidal medium for fuel.

It is the primary purpose of this invention to provide a rotary type burner with means whereby the fuel and combustion supporting air will be mixed in a most thorough manner and then forced toward the furnace in a definite flow pattern.

A further object of this invention is to provide a rotary burner of the present type with air blowing means effective to cause all of the combustion-supporting air to flow in a definite pattern at all times irrespective of the air blower speed or the capacity at which the burner is operating.

A more specific object of this invention is to provide means for such a burner whereby the combustion-supporting air may be forced without any interference into the combustion chamber thereof in a smooth, annular-shaped pattern with the fuel medium being added to such air from a plurality of nozzles disposed substantially at right angles to the direction of said air flow.

Another object of the present invention is to provide a burner of the present type with a construction which is such that fuel atomizing means may be readily removed therefrom without the necessity of dismantling any portions of the burner unit.

A still further object of the present invention is to provide a burner having an air blower with an air passageway to the furnace, which passageway is entirely free of all obstacles thereby to obtain a smooth air flow whereby more driving power, higher efficiency and better distribution are obtained.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the accompanying drawings

Fig. 1 represents a side elevation of a rotary type oil burner in which one form of the present invention is incorporated.

Fig. 2 represents a side elevation of a rotary type oil burner in which a second form of the present invention is incorporated.

Fig. 3 represents a front elevation of the device disclosed in Fig. 1.

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Fig. 4 represents a top plan view of portion of the device disclosed in Fig. 3.

Fig. 5 represents a partial front elevation of the device disclosed in Fig. 2.

Fig. 6 is an enlarged section taken substantially along line 6—6 of Fig. 3.

Fig. 7 is an enlarged section taken substantially along line 7—7 of Fig. 5.

Burners of the present type are primarily adapted to use as a fuel natural gas, liquid oil, or a combination of both. However, whenever a liquid fuel such as oil is used, it has been found most efficient to atomize such a liquid very thoroughly before igniting the same. Steam under pressure has been found a most efficient and cheap medium for such atomization, and the present invention contemplates the use of such a medium, but it is to be understood that other gaseous mediums under pressure could also be employed.

A rotary type burner which is particularly adapted for burning liquid oil is illustrated in Figs. 1 and 3 of the present drawings. Referring particularly to Figs. 1 and 3, one form of the present invention is incorporated in a burner unit comprising, a substantially cylindrical casing 10 which is adapted to be connected with a furnace or boiler unit (neither of which is herein shown) as at 10'. A journal box 11 is rigidly secured within the central portion of casing 10 by means of spider legs 12 which project radially from said journal box to be secured by means of bolts 13 to an annular flange portion 14 of said casing. This journal box 11 is cored as at points 15 thereby to form a hollow jacket for receiving circulating cooling water which may gain entrance into said jacket by means of an aperture 16 provided in the bottom of said jacket. A water overflow aperture 17 is provided in the top portion of the jacket. The journal box is hollow and is provided at its opposite end portions with openings which are adapted to receive spaced ball bearing members 18 and 19 in which is rotatably journaled, coaxially of said casing 10, a tubular shaft 20. A tubular spacer member 21 functions, in conjunction with elements 22 and 23, to retain the bearings 18 and 19 in their proper positions. The spacer 21 has formed thereabout an annular groove 24 adapted for the receipt of an oil slinger 25 which projects downwardly into a hollow portion 26 of the jacket, which portion functions as an oil sump. Oil may be added to this sump through a conduit 27 which is connected to the jacket as at 28.

Mounted upon the rearward portion of jacket 11 is a housing 29 secured to said jacket by means of a plurality of bolts 30, only one of which is dis-

closed herein. Disposed within and coaxially of the tubular shaft 20 is a second tubular shaft or steam conduit 31 which at its rear end is welded at 32 to a sleeve member 33 which in turn is force-fitted into the shaft 20 and secured to a hollow plug 34 by means of a radially disposed pin 35. The hollow plug 34 extends out of the shaft 20 to be rotatable within a bushing 36 carried rigidly within the housing 29. The forward end of the conduit 31 is welded, or otherwise suitably secured, to a circular spider 37 which is force-fitted into the shaft 20. This spider 37, in conjunction with the sleeve 33, secures shaft 20 and conduit 31 together as a unit. Threaded upon the forward end of the conduit 31 is a nozzle 38 whose cone-shaped aperture 39 communicates directly with the hollow portion of the conduit 31. Radial apertures 40, 40 are provided in said nozzle 38 thereby to communicate with that space provided between the rotary shaft 20 and the conduit 31.

The housing member 29 is normally connected with two separate sources of fluid supply under pressure. In the present case these separate supplies contain liquid oil and steam respectively. Oil is introduced into a hollow portion 41 of the housing through a conduit 42, and then this oil passes into the plug 34 after first passing through a filter screen 43 which is secured over one end of the bushing 36. A radial bore 44, leading from the hollow portion of the plug 34 to a milled groove 45 formed longitudinally of the sleeve 33, leads the oil into the space provided between the conduit 31 and the shaft 20. This oil, still under pressure, is thus forced between the legs of the spider 37 and into the nozzle cone 39 through the medium of the radial ports 40, 40 provided in said nozzle.

Steam, under a pressure higher than that which is provided for the oil, gains entrance into the housing 29 by means of a conduit 46 and then passes into the conduit 31 by way of a milled slot 47 formed longitudinally in the sleeve 33. This slot 47 communicates with the hollow portion of conduit 31 through a passage which is left open due to the fact that the conduit 31 is spaced from the forward end of the plug 34. Thus, the steam travels axially through the conduit 31 to be discharged through the conical opening 39 of the nozzle 38. As the steam thus passes through this conical opening it is thoroughly mixed with the oil issuing into said opening by way of the bores 40, 40 and, therefore, the nozzle 38 functions to atomize the oil thoroughly before discharging the same.

Spaced between the rearward end portion of the shaft 20 and the housing 29 is a grooved labyrinth bushing 48 which functions as a barrier for preventing the oil from escaping out of its normal path. Steam entering into the housing 29 finds its way into grooves 48' of the labyrinth 48, between the labyrinth and the shaft 20, and therein condenses thus to function as a barrier for the oil. The steam, being forced into the housing under a pressure higher than that provided for the oil, will thus effectively prevent any oil escaping through the labyrinth 48.

By thus introducing the steam into the housing 29 about the oil conducting plug 34 and then forcing the same axially of the conduit 31, two desirous results are accomplished. First, as above disclosed, the steam functions in the labyrinth 48 as an oil barrier, and secondly, the oil by surrounding the steam throughout the major portion of the conduit 31, functions as an effective heat insulator thereby to prevent the heat of the steam from being transferred to the bearings 18 and 19. As the steam sometimes enters the burner in a super-heated condition, it is important that the bearings be so protected.

Mounted on the forward portion of the shaft 20, and rigidly welded thereto as at 49, is a ring 50 to which is secured, by means of bolts 51 (only one of which is herein shown), a rotary burner head. This burner head comprises a hollow disk-like manifold casing, designated generally as 52, which has a diameter substantially less than that of the casing 10 thereby to form an annular air passage therebetween. This head or casing is mounted coaxially of the shaft 20 and is provided with a cylindrical mixing chamber 53 which is formed concentrically of the head member. More specifically, this head comprises a rearward circular wall 54 upon which is mounted a forward wall 55 by means of bolts 55'.

The spacing provided between these walls 54 and 55 forms the above noted mixing chamber 53. Referring particularly to Figs. 1, 3 and 6, the forward wall 55 of the rotary head has provided thereon a series of bosses 56 which are equidistantly spaced from the center of the head and which are disposed in the same angular direction. Each of these bosses is provided with an aperture 57 into which is threaded a nozzle element 58 containing an orifice 59 which communicates with the mixing chamber 53. Referring particularly to Figs. 4 and 6, it is to be understood that each of these nozzles is disposed upon the wall 55 so as to form an acute angle therewith and to be disposed substantially tangentially of the wall 55. Thus, the atomized oil which is ejected from the nozzle 38 is forced into the chamber 53 and out of each of the orifices 59 at an angle such that the head 52 will rotate in a counterclockwise direction under the reaction force of said jets. It is to be understood that such rotation of the head will carry with it the shaft 20 and conduit 31.

Provided on the flanged periphery of the wall member 55 are a plurality of fan blades 60 which are disposed in a manner such that when rotated, a blast of air will be caused to flow axially of said casing 10 and in a direction towards the furnace to which the casing is secured. At the rearward end of the casing 10 is disposed an air metering unit or register 61 which forms no part of the present invention and is not herein disclosed in detail. It is sufficient to say that this metering unit or air register functions to vary the quantity of air which the fan blades 60 may draw into the casing.

The present burner is adapted to be secured to a furnace or boiler by means of a flange 10' and the air blast caused by the fan blades 60 is forced in a direction towards said furnace in an annular shaped path due to the presence of the rotary head axially disposed within the casing 10. Thus, the nozzles 58 are disposed entirely on the leeward side of the rotary head and at points completely within the air-stream annulus. Referring particularly to Fig. 3, the atomized oil projects out of each nozzle in a path indicated by pattern lines 62. Thus, the jet from each nozzle is projected into the air stream from a direction substantially at right angles to the direction of flow thereof, and by this action the atomized oil becomes thoroughly mixed with the air to the end that a most efficient combustion mixture is formed. Furthermore, as the nozzles themselves do not project into the air stream, a most de-

sirable air stream is formed, having no interfering elements projecting therein and, therefore, no undue turbulence is set up which would otherwise disturb the annular air path. Therefore, more driving power is obtained from the potential energy of the initial fluid pressure, for the reason that there are no physical obstacles in the burner opening to offer resistance to the air flow being discharged from the fan, such as would be the case with existing types of reaction burners where apertured spokes are used as driving arms and are distributed within the air streams immediately in front of a fan.

The present construction maintains the higher efficiency from the agitative and mixing turbulence of the fuel and air by causing all the air and the atomized fuel to flow away from the fan in a definite pattern at all times, irrespective of the fan speed or the capacity at which the burner is operating. Furthermore, all of the air for combustion is discharged around and at substantially right angles to the streams of atomized fuel being discharged from the orifices or tips. By the orifices or tips being located on the same circular centerline at the periphery of the hollow revolving manifold disk and at substantially right angles to and within the air pattern, a definite fuel and air pattern are maintained at all times over the entire capacity range of the burner. This permits a very great turn-down ratio of the burner capacity. The scrubbing action of the revolving fuel streams within the hollow cylinder of the air pattern will effect a very desirable and violent mixing agitation within a fixed zone.

It is also to be understood that by forming the fluid-distributing head 52 as a hollow disk and positioning said disk tangentially of the air stream, it is thereby subjected to the heat radiating from the burning gases. The disk will, therefore, function with regenerative and recuperative characteristics thereby to effect greater pre-atomizing efficiency within the disk manifold. In order to prevent too much heat from radiating into the disk manifold there is provided upon the outer wall 55 an insulating plate 63 which is spaced from the wall 55 by means of pins 63 and secured thereto by a screw 64. The dead air space between the plate 63 and wall 55 functions to limit the amount of radiant heat received within the manifold.

The present invention may also be incorporated in that type of rotary burner which employs oil and gas as a fuel and steam as an atomizing medium for the oil. Figs. 2, 5 and 7 illustrate such a burner construction.

Referring particularly to Fig. 2, it is to be understood that this second burner construction is similar to that of the first in so far as the general construction of the casing, journal box, and rotary shaft are concerned. Therefore, the similar corresponding parts of the two burners have been similarly numbered. The following description, therefore, will concern itself only with those parts of the second burner which are different from those of the first burner.

Carried rigidly within the opposed hollow end portions of the tubular shaft 20 are a pair of spaced spider members 70 and 71 in which in turn is mounted a hollow conduit shaft 72. The rear end portion of the conduit 72 extends beyond the confines of the shaft 20 and into the hollow portion of the housing 29 which is secured by means of bolts 30 to the journal box 11. Secured in turn on this housing 29 is a valve box 73. Bolts 74 removably secure the valve box upon the housing 29.

Mounted within and coaxially of the conduit 72 is a secondary conduit 75 which is carried at the forward portion of the conduit 72 by means of a nozzle 76 the forward portion of which is force-fitted within the furnace end of the conduit 72. The forward portion of the conduit 75 is threaded into the hollow rearward portion of the nozzle 76 as at 77. The rearward end of the conduit 75 is received within and welded to a sleeve member 78 which in turn is force-fitted within the rearward end of the conduit 72 and secured to the conduit by means of a set screw 79. The above noted shaft 20, conduit 72, and conduit 75 are all disposed in concentric relation with each other and coaxially of the casing 10. The rear portion of the conduit 72 is rotatably received within a bushing 80 which is rigidly carried by the valve box 73. A second bushing 81 is also carried by the valve box 73 and it is adapted to have rotatably mounted therein a hollow plug member 82 whose forward portion extends into the sleeve 78 and is rigidly secured therein by means of a cross pin 83. From the above description it is to be understood that the shaft 20, the conduits 72 and 75, the sleeve 78, the nozzle 76, and the plug 82 all are rigidly secured together and, therefore, are rotatable as a unit.

The rear portion of the valve box 73 is adapted to be connected to a source of liquid oil supply, not herein shown. This oil, under pressure, enters the valve box 73 through a pipe 84 and then flows through the hollow plug 82 after first passing through an oil filter 85 disposed within a hollow portion 86 of the valve box 73. This filter 85 is carried by the bushing 81. A radially disposed aperture 87 permits the oil to flow from the plug 82 through a milled slot 78' provided in the sleeve 78, and into an annular passage provided between the conduits 72 and 75.

The steam for atomizing this oil gains entrance into the valve box 73 by way of a pipe 88. This steam flows into the hollow conduit 75 by way of a milled slot 89 provided longitudinally of the sleeve 78. Thus, the steam is delivered axially of the conduit 75 and is completely surrounded throughout a major portion of its passage by the oil which acts as an insulator and prevents the heat from the high pressure steam from being conducted to the various relatively moving elements of the burner unit.

Gas under pressure is delivered into the hollow portion of the housing 29 through a pipe 90. From the hollow portion 91 of the housing 29 the gas will flow forwardly to enter the passage provided between the shaft 20 and the conduit 72 thereby to surround both the steam and oil passageways.

Rigidly mounted upon the shaft 20, at the furnace end thereof, is a rotary fluid-distributing head generally designated by the numeral 92. This head 92 comprises a back wall member 93 in the form of a cylindrical disk which is secured by means of bolts 94 to a ring 95 welded upon the furnace end of the shaft 20. A baffle plate 96 having an annular peripheral portion 97 is carried upon the back wall member 93 by bolts 98. As may be seen from Fig. 2, the baffle plate 96 is mounted concentrically within the casing 10 and its peripheral portion 97 has a diameter substantially less than that of the casing 10 thereby to form therewith an annular air passageway. Extending outwardly and radially

from the peripheral portion 97 is a plurality of fan blades 99 which are designed to force air axially of the casing 10, past the fluid-distributing head 92, and toward the furnace. Mounted upon the furnace side of the baffle plate 96 is a disk 100 which forms with the baffle 96 a cylindrical manifold 101. The screws 102 secure the disk 100 against the baffle 96. Formed about the face of the disk 100 adjacent the periphery thereof are a plurality of projecting bosses 103 each of which is angularly disposed relative to the face of the disk 100 at points equidistantly spaced from the center of the disk. Provided in each one of these bosses is a nozzle 104 having an orifice 105 which is substantially disposed at an acute angle relative to the face of the disk 100. Mounted upon the face of the disk 100, by means of pins 106, is an insulating plate 107. This plate is adapted to be spaced from the disk 100 thereby to provide an air space therebetween for the purpose of preventing too much radial heat from the furnace from being absorbed by the fluids within the head 92.

Referring particularly to Fig. 2, it is to be understood that the head 92 essentially comprises a stepped hollow disk disposed coaxially of and mounted for rotation within the casing 10. The disk 100, projecting outwardly from the nozzle-containing portion of the peripheral portion 97, forms at the junction of these two elements a step, and the baffle plate 96 thus forms a pair of axially spaced cylindrical manifold cavities 101 and 108, of which each cavity is disposed within a respective stepped portion of the head or disk.

Provided between the disk 96 and the back wall 93 is a manifold chamber 108 which is substantially of circular shape and which is disposed coaxially of the casing 10. Communicating with this manifold 108 are a plurality of orifices 109 each of which is provided within the face of the disk 96 at points equidistant from the center of the casing 10. Each of these orifices is disposed in parallelism with the orifices 105 which are provided in the nozzles 103. Fluids, issuing under pressure from the orifices 105 and 109, cause, by reaction against the head 92, the rotation of the entire head 92 about the axis of a casing 10. This rotation will be effective to force air axially of the casing 10 by means of the fan blades 99.

The gas which is conducted through the passageway formed by the tube 20 and the conduit 72 will issue into the manifold 108 under pressure and, therefore, find its way out of the orifices 109 thereby to rotate the head 92 and at the same time be discharged substantially at right angles into the path of the air which is forced through the casing 10. The oil following along the passage defined by the spaced conduits 72 and 75 will pass about the rearward portion of the nozzle 76 and thus be inwardly and radially discharged into a conical portion 110 of the nozzle by way of a plurality of radially disposed bores 111 formed in the nozzle 76. The atomizing steam forces its way through the conduit 75 to be discharged into the manifold 101 by way of the conical passageway 110 provided in the nozzle 76. Thus it is to be understood that the oil and steam will be thrown into violent contact with each other within the conical passageway 110 to the end that steam will be effective to atomize the oil as the latter is being discharged into the manifold 101. The atomized oil will then issue from each of the orifices 105 and by

jet reaction rotate, in cooperation with the gases issuing from orifices 109, the head 92.

Referring particularly to Fig. 7, it is to be understood that both the gas and the atomized oil are discharged into the annular shaped air pattern from orifices disposed substantially at right angles to the direction of flow of air, thus to effect a complete mixture of oil, gas and air.

Disposed axially of the nozzle 76 is a relatively short hollow tube 112 formed with an enlarged head portion 113 which is secured within both the plate 107 and the disk 100. Located between the plate 107 and the disk 100 and within the head 113 are a plurality of radial bores 114, 114, which communicate with the hollow portion of the tube for the purpose of delivering steam between the plate 107 and the disk 100. This steam functions as an insulator to the extent that it will limit the amount of radiant heat transferred from the combustion chamber of the furnace to the fluid-distributing manifold.

From the above description it is to be understood that the present fluid-distributing head substantially comprises a disk-like head having a pair of axially spaced cylindrical manifold cavities 101 and 108 separated by means of the baffle plate 96; said manifold cavities being in communication with a respective one of the fluid conduits formed by the concentrically spaced tubes 72 and 75, and the shaft 20. Each of these manifold cavities has in communication therewith a separate group of fluid-atomizing nozzles carried by the leeward or furnace side of the disk for the purpose of discharging therefrom jets of fluid which will, by reaction, effect a rotation of the disk.

It is to be further understood that Fig. 2 discloses only a preferred form of a dual manifold construction and that the specific form of this construction could be modified without going outside the confines of the present invention. For example, the present fluid-distributing head could be considered as a pair of hollow cylindrical shells disposed adjacent each other and being coaxially mounted upon shaft 20 for rotation therewith.

Also provided on valve box 73 is a scavenging valve 118 which, when opened along with the bypass valve 115, permits steam to pass, by way of bore 119, through all of the gas and oil passageways for the purpose of cleaning the same preparatory to shutting down the burner unit.

Referring to Fig. 1, the housing member 29 is, like the valve box 73, provided with a scavenging valve 120 which, when opened, permits steam to enter through a bore 121, into the oil passageways for the purpose of cleaning the same.

I claim:

1. In a fluid burner of the type described having a cylindrical casing adapted to be connected to a furnace, a conduit connected to a source of fluid under pressure and extending into said casing, and means to force an air blast axially of said casing toward said furnace; the improvement which consists in the provision of a fluid-distributing means for atomizing and discharging said fluid into said air blast, said fluid-distributing means comprising a cylindrical member disposed coaxially of and within said casing, said member having a diameter substantially less than that of said casing, thereby to force said air blast to flow in an annular pattern, a shaft mounted for rotation coaxially of said member, a plurality of nozzles carried by said member and disposed entirely behind the leeward side of said member, each of said nozzles forming an acute angle with the leeward side of said mem-

ber so that the fluid issuing therefrom under pressure will produce by reaction the rotation of said shaft.

2. In a fluid burner of the type described having a cylindrical casing adapted to be connected to a furnace, a conduit extending into said casing and connected to a source of fluid under pressure, and means to force an air blast axially of said casing toward said furnace; the improvement which consists in the provision of a fluid-distributing means for atomizing and discharging said fluid into said air blast, said fluid-distributing means comprising, a disk disposed coaxially of and mounted for rotation within said casing and having a diameter substantially less than that of said casing, said disk having a cylindrical manifold concentrically disposed therein, means connecting said manifold with said conduit, and a plurality of fluid-atomizing nozzles carried upon the leeward face of said disk and communicating with said manifold, each nozzle forming an acute angle with the leeward side of said disk so that the fluid issuing therefrom under pressure will produce by reaction the rotation of said disk.

3. In a fluid burner of the type described having a cylindrical casing adapted to be connected to a furnace, a pair of conduits each connected to a separate supply of fluid under pressure and extending into said casing, and means to force an air blast axially of said casing toward said furnace; the improvement which consists in the provision of a fluid distributing means for atomizing and discharging said fluids into said air blast, said fluid-distributing means comprising, a disk disposed coaxially of and mounted for rotation within said casing, said disk having a diameter substantially less than that of said casing, and having a cylindrical manifold cavity concentrically disposed therein, means connecting said manifold cavity with each of said conduits, and a plurality of fluid-atomizing nozzles carried upon the leeward face of said disk and communicating with said manifold cavity, each nozzle forming an acute angle with the leeward side of said disk so that the fluids issuing therefrom under pressure will produce by reaction the rotation of said disk.

4. A fluid burner comprising a cylindrical casing adapted to be connected to a furnace, a conduit connected to a source of fluid fuel under pressure and extending into said casing, a fluid fuel-distributing device including a hollow disk disposed coaxially of and mounted for rotation within said casing, the diameter of said disk being substantially less than that of said casing, means connecting said conduit with the hollow interior of said disk, a plurality of fluid fuel-discharging nozzles communicating with the hollow interior of and carried upon the furnace side of said disk, each nozzle being disposed substantially at an acute angle with the leeward side of said disk so that the fluid fuel issuing therefrom will produce by reaction the rotation of said disk, and a plurality of fan blades radiating outwardly from and being carried by said disk for drawing air axially into said casing past said disk and toward said furnace.

5. A fluid burner comprising a cylindrical casing adapted to be connected to a furnace, a cylindrical conduit extending axially into said casing and connected to a source of fluid fuel under pressure, a fluid fuel-distributing device including a hollow disk mounted for rotation within said casing and coaxially of said conduit, said conduit being in communication with the interior of said hollow disk, the diameter of said hollow disk being substantially less than that of said casing, a plurality of fan blades carried by said hollow disk for drawing air axially into said casing and past said disk, and a plurality of fluid nozzles carried upon the leeward side of said disk and communicating with the hollow interior thereof, each of said nozzles being disposed adjacent the periphery of said disk to form an acute angle with the leeward side thereof so that the fluid fuel issuing therefrom under pressure will produce by reaction the rotation of said disk and at the same time will be directed into the path of the air blast.

6. A fluid burner comprising, a cylindrical casing adapted to be connected to a furnace, a cylindrical conduit extending axially into said casing and connected to a source of fluid under pressure, a fluid fuel-distributing device including a hollow disk mounted for rotation within said casing and coaxially of said conduit, said conduit being in communication with the interior of said hollow disk, the diameter of said hollow disk being substantially less than that of said casing, a plurality of fan blades radiating outwardly from the periphery of said hollow disk for drawing air axially into said casing and past said disk, and a plurality of fluid fuel-discharging nozzles carried upon the leeward side of and adjacent the periphery of said disk and communicating with the hollow interior thereof, each of said nozzles being carried equidistantly from the disk axis and being disposed substantially tangentially of the disk and forming an acute angle with the leeward side thereof so that the fluid fuel issuing therefrom under pressure will produce by reaction the rotation of said disk.

7. In a fluid burner of the type described having a cylindrical casing adapted to be connected to a furnace, a conduit extending into said casing and connected to a source of fluid under pressure, and means to force an air blast axially of said casing toward said furnace; the improvement which consists in the provision of a fluid-distributing means for atomizing and discharging said fluid into said air blast, said fluid-distributing means comprising a disk disposed coaxially of and mounted for rotation within said casing and having a diameter substantially less than that of said casing, said disk having a cylindrical manifold cavity concentrically formed therein, a primary fluid-atomizing nozzle in communication with said conduit and said manifold cavity, said primary atomizing nozzle being disposed axially of said disk, and a plurality of secondary fluid-atomizing nozzles formed in the leeward face of said disk in communication with said cavity, each secondary nozzle forming substantially an acute angle with the furnace side of said disk so that the fluid issuing therefrom under pressure will produce by reaction the rotation of said disk.

8. A fluid burner comprising, a cylindrical casing adapted to be connected to a furnace, a tubular shaft disposed coaxially of and mounted for rotation within said casing, a fluid fuel-distributing disk disposed coaxially of and secured upon one end of said shaft, the diameter of said disk being substantially less than that of said casing, said disk having a cylindrical manifold cavity concentrically formed therein and opening into the tubular portion of said shaft, a plurality of fluid fuel-discharging nozzles formed entirely upon the furnace side of said disk and communicating with said cavity, each nozzle being disposed substantially at an acute angle with the furnace

side of said disk, a conduit connected to a source of fluid fuel under pressure and being in direct communication with the tubular portion of said shaft, and a plurality of fan blades radiating outwardly from and being carried by said disk for drawing air axially into said casing past said disk and toward said furnace.

9. A fluid burner comprising, a cylindrical casing adapted to be connected to a furnace, a tubular shaft disposed coaxially of and mounted for rotation within said casing, a fluid fuel-distributing disk disposed coxially of and secured upon one end of said shaft, the diameter of said disk being substantially less than that of said casing, said disk having a cylindrical manifold cavity concentrically formed therein and communicating directly with the tubular portion of said shaft, a plurality of fluid fuel-discharging nozzles formed entirely upon the furnace side of said disk and communicating with said cavity, each nozzle being disposed substantially at an acute angle with the furnace side of said disk, means connected to two separate supplies of fluid under pressure and extending into said tubular shaft for delivering said separate supplies to the vicinity of said disk, a fluid-mixing nozzle disposed within said tubular shaft for mixing said two fluids and discharging the same axially into said cavity, and a plurality of fan blades radiating outwardly from and carried by said disk for drawing air axially into said casing past said disk and toward said furnace.

10. A fluid burner comprising, a cylindrical casing adapted to be connected to a furnace, a tubular shaft disposed coaxially of and mounted for rotation within said casing, a fluid fuel-distributing disk disposed coaxially of and secured upon one end of said shaft, the diameter of said disk being substantially less than that of said casing, said disk having a cylindrical manifold cavity concentrically formed therein and communicating directly with the tubular portion of said shaft, a plurality of fluid fuel-discharging nozzles disposed entirely within a cylinder defined by the periphery of said disk and upon the furnace side of said disk, each of said nozzles disposed substantially at an acute angle with the furnace side of said disk and being in communication with said manifold cavity, means connected to separate supplies of fluid under pressure and extending into said tubular shaft for delivering said separate supplies to the vicinity of said disk, means contained within said tubular shaft for mixing said fluid supplies and directing the mixture axially into said manifold cavity, and fan blades radiating outwardly from and carried by said shaft for drawing air axially into said casing past said disk and toward said furnace.

11. A fluid burner comprising a cylindrical casing adapted to be connected to a furnace, a tubular shaft disposed coaxially of and mounted for rotation within said casing, a fluid fuel-distributing disk disposed coaxially of and secured upon one end of said shaft, the diameter of said disk being substantially less than that of said casing, said disk having a cylindrical manifold cavity formed therein and communicating directly with the tubular portions of said shaft, a plurality of fan blades radiating outwardly from and being secured to the periphery of said disks for drawing air axially of said casing past said disk and toward said furnace, means connected to separate supplies of fluid under pressure and extending into said tubular shaft for delivering said separate supplies to the vicinity of said disk, means contained within said tubular shaft for mixing said fluid supplies and directing the mixture axially into said manifold cavity, and a plurality of fluid fuel-discharging nozzles carried upon the leeward side and communicating with the manifold cavity of said disk, each nozzle being located equidistantly from the disk axis and being disposed substantially at an acute angle with the leeward side of said disk so that fluid issuing therefrom under pressure will produce by reaction rotation of said disk and said shaft.

12. In a fluid burner of the type described having a cylindrical casing adapted to be connected to a furnace, a pair of conduits each connected to a separate supply of fluid under pressure and extending into said casing, and means to force an air blast axially of said casing toward said furnace; the improvement which consists in the provision of a fluid-distributing means for atomizing and discharging said fluid into said air blast, said fluid distributing means comprising, a hollow disk disposed coaxially of and mounted for rotation within said casing, said disk having a diameter substantially less than that of said casing, a baffle plate disposed within and concentrically of said hollow disk thereby to form a pair of axially spaced cylindrical manifold cavities, means connecting each of said conduits with a respective one of said cavities, and a plurality of fluid-atomizing nozzles carried by said disk in the area of the periphery thereof, each of said cavities being in direct communication with certain of said nozzles so that the fluid issuing therefrom will produce by reaction the rotation of said disk.

13. In a fluid burner of the type described having a cylindrical casing adapted to be connected to a furnace, a pair of conduits each connected to separate supply of fluid under pressure and extending into said casing, and means to force an air blast axially of said casing toward said furnace; the improvement which consists in the provision of a fluid-distributing means for atomizing and discharging said fluids into said air blast, said fluid-distributing means comprising, a hollow disk disposed coaxially of and mounted for rotation within said casing, said disk having a diameter substantially less than that of said casing, a baffle plate disposed within and concentrically of said hollow disk thereby to form a pair of axially spaced cylindrical manifold cavities, means connecting each of said conduits with a respective one of said cavities, and two groups of fluid-atomizing nozzles carried by the leeward side of said disk, each group of said nozzles being in communication with a respective one of said cavities, and each nozzle being disposed substantially at an acute angle with the leeward side of said disk so that the fluid issuing therefrom will produce by reaction rotation of said disk.

14. In a fluid burner of the type described having a cylindrical casing adapted to be connected to a furnace, a pair of conduits each connected to a separate supply of fluid under pressure and extending into said casing, and means to force an air blast axially of said casing towards said furnace; the improvement which consists in the provision of a fluid-distributing means for atomizing and discharging said fluids into said air blast, said fluid distributing means comprising, a stepped hollow disk disposed coaxially of and mounted for rotation within said casing, said disk having a diameter substantially less than that of said casing, a baffle plate disposed within

and concentrically of said hollow disk thereby to form a pair of axially spaced cylindrical manifold cavities, each cavity being disposed within a respective stepped portion of said disk, means connecting each of said conduits with a respective one of said cavities, and a group of fluid-discharging nozzles disposed upon the leeward side of and adjacent the periphery of each stepped portion of said disk, each nozzle being in communication with its adjacent disk cavity and being disposed substantially at an acute angle with the leeward side of said disk so that the fluid issuing therefrom will produce by reaction the rotation of said disk.

15. In a fluid burner of the class described, a cylindrical casing adapted to be connected to a furnace, a pair of conduits each connected to a separate supply of fluid under pressure and extending into said casing, a fluid-distributing means including a hollow disk disposed coaxially of and mounted for rotation within said casing, said disk having a diameter substantially less than that of said casing, a baffle plate disposed within and concentrically of said hollow disk thereby to form a pair of axially spaced cylindrical manifold cavities, means connecting each of said conduits with a respective one of said cavities, a plurality of fluid-atomizing nozzles carried by the furnace side of said disk in the area of the periphery thereof, each of said cavities being in direct communication with certain of said nozzles so that the fluid issuing therefrom will produce by reaction the rotation of said disk, and a plurality of fan blades radiating outwardly from and attached to said disk for drawing air axially of said casing and toward said furnce.

16. In a fluid burner of the class described, a cylindrical casing adapted to be connected to a furnace, a pair of conduits each connected to a separate supply of fluid under pressure and extending into said casing, a fluid-distributing means including a hollow disk disposed coaxially of and mounted for rotation within said casing, said disk having a diameter substantially less than that of said casing, a baffle plate disposed within and concentrically of said hollow disk thereby to form a pair of axially spaced cylindrical manifold cavities, means connecting each of said conduits with a respective one of said cavities, the furnace side of said disk being apertured to form two groups of fluid atomizing nozzles, each group of said nozzles being in communication with a respective one of said cavities, each nozzle being disposed substantially at an acute angle with the furnace side of said disk so that the fluid issuing therefrom will produce by reaction rotation of said disk, and a plurality of fan blades radiating outwardly from and being carried by said disk for drawing air axially of said casing past said disk and towards said furnace.

17. In a fluid burner of the type described having a cylindrical casing adapted to be connected to a furnace, a tubular shaft disposed coaxially of and mounted for rotation within said casing, a fluid-distributing means including a pair of hollow cylindrical shells disposed adjacent each other and being coaxially mounted upon one end of said shafts for rotation therewith, the radii of said shells each being substantially less than that of said casing, means carried by said shaft for drawing air axially of said casing past said shells and toward said furnace, means connected to two separate supplies of fluid under pressure and extending into said tubular shaft for delivering each of said separate fluid supplies to the hollow interior of a respective one of said shells, and a group of fluid-discharging nozzles disposed at and carried by the leeward side of each of said shells, each nozzle being in communication with its associated shell and being disposed substantially at an acute angle with the furnace side of said shell so that the fluid issuing therefrom will by reaction rotate said shells.

18. In a fluid burner of the type described having a cylindrical casing adapted to be connected to a furnace, a pair of inner and outer tubes disposed one within the other coaxially of and within said casing, each of said tubes extending out of said casing away from said furnace to be connected to a separate supply of fluid under pressure, a fluid-distributing means including a pair of hollow circular manifolds disposed adjacent to and spaced axially of each other and mounted for rotation within and coaxially of said casing between said tubes and said furnace, the radii of said manifolds each being substantially less than that of said casing thereby to form an unobstructed annular air passage between the peripheries thereof and said casing, means rotatable with said manifolds for forcing air axially of said casing and towards said furnace, the outer of said tubes being in direct communication with that manifold remote from said furnace, and the inner of said tubes passing through the remote manifold to communicate directly with the remaining manifold, and two groups of fluid-discharging nozzles disposed at and carried by the leeward side of said manifolds, each nozzle group being in direct communication with a respective one of said manifolds, each nozzle being disposed substantially at an acute angle with the leeward side of said manifold so that the fluid issuing therefrom will by reaction rotate said manifolds.

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